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# THE COLLETID PTILOGLOSSA ARIZONENSIS TIMBERLAKE, A MATINAL POLLINATOR OF SOLANUM

(Hymenoptera)

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The Neotropical colletids of the tribe Caupolicanini are represented in the southeastern and southwestern United States by four nominal species, two each in the genera *Caupolicana* and *Ptiloglossa*. These large, robust, hairy bees are superficially anthophorid-like and differ from other Diphaglossinae by having the jugal lobe of the posterior wing reaching beyond the apex of the cubital cell, the notauli well developed, the pre-episternal suture present, the first flagellar segment at least nearly as long as the scape, the first M peduncled, and the malar areas very short (Moure, 1945). *Ptiloglossa* have a shining metallic lustre to the abdomen and the outer spur of the hind tibiae of the males is fused to the tibia. *Caupolicana* lack the metallic lustre to the abdomen and the hind tibial spurs of the males are both free. *Caupolicana electa* (Cresson) occurs in the sand ridge areas of the coastal plain in southeastern United States from North Carolina to Georgia and Alabama (Mitchell, 1960), *C. yarrowi* (Cresson) in the arid southwest from Texas to southern Arizona and northern Mexico (Michener, 1951). *Ptiloglossa arizonensis* Timberlake, and *Pt. jonesi* Timberlake were each described originally from Portal, Arizona (Timberlake, 1946). The type series of both species (77 ♀♀ of the former, 2 ♀♀ of the latter) were collected by W. W. Jones during July and August at flowers of *Solanum elaegnifolium*, although the circumstances of the captures were not recorded. Subsequently, at the Southwestern Research Station, in Cave Creek Canyon, Chiricahua Mountains, 5 miles west of Portal, Dr. M. A. Cazier and his colleagues took a series of males from flowers of *Melilotus alba*.

In late July and early August of 1961 I had an opportunity

[1]The writer wishes to express appreciation to the authorities of the American Museum of Natural History, and especially to Dr. M. A. Cazier, Resident Director, Southwestern Research Station, Portal, Arizona, for providing facilities for this and a number of related studies, to Professor Charles M. Rick, of the Department of Vegetable Crops, University of California, Davis, for making observations on the behavior of *Solanum* pollinators in Wisconsin, and to Robbin Thorp, Department of Entomology and Parasitology, University of California, Berkeley, for aid in the analysis and identification of pollen.

small grains containing protoplasm (determined by staining with acid fuchsin). Both types of pollen were also found in anthers of herbarium specimens of this species. The existence of aborted grains of pollen in *Solanum* spp. has been discussed by Stow (1927), who found a correlation between their presence in *S. tuberosum* L. and high temperatures, and by Jørgensen (1928), who found a high proportion of bad pollen grains in experimentally produced euploid and aneuploid forms. However, since Heiser & Whitaker (1948) found that California specimens of *S. elaeagnifolium* had the chromosome number n = 12, and were therefore diploid, the aborted pollen may have been the result of hybridiza-

Table I.—Pollen types carried by a sample of bees collected from flowers of *Solanum eleagnifolium* between 5:09 and 5:34 A.M.

| Date | Time (A.M.) | Bee Species | Pollen Types |
|---|---|---|---|
| July 25, 1961 | 5:18 | *Pt. arizonensis* | *Solanum* + *Liliaceae* |
| | 5:32 | *Bombus morrisoni* | *Solanum* |
| July 26, 1961 | 5:13 | *Pt. arizonensis* | Liliaceae |
| | 5:24 | *B. morrisoni* | *Solanum* |
| | 5:26 | *B. sonorus* | *Solanum* |
| July 27, 1961 | 5:09 | *Pt. arizonensis* | *Solanum* |
| | 5:14 | *Pt. arizonensis* | Liliaceae |
| July 28, 1961 | 5:15 | *Pt. arizonensis* | Liliaceae (small load) |
| | 5:22 | *Pt. arizonensis* | Liliaceae + *Solanum* |
| | 5:34 | *Pt. arizonensis* | *Solanum* |

tion, as in the *S. nigrum* complex (Stebbins and Paddock, 1949), or possibly, may have been produced by an adverse environment. Counts of pollen grains in a series of transects across a slide prepared from pollen collected by a female *Ptiloglossa* revealed that "good" pollen composed only 36 per cent of the total. The equatorial diameter of the pollens of this species are: bad grains— 25.7$\mu$, (range 23.7$\mu$ to 29.0$\mu$); good grains— 34.4$\mu$, (range 31.7$\mu$ to 37.0$\mu$). Pure loads of *Solanum* pollen were present on three specimens of *Bombus* and two of *Ptiloglossa*. Mixed loads of *Solanum* and liliaceous pollen were present on two *Ptiloglossa*. The other three *Ptiloglossa* had pure loads of liliaceous pollen. The observed high proportion of aborted pollen in *Solanum elaeagnifolium* is not only of interest from the botanical viewpoint, because of the reduced potential for fertilization, but also from the entomological standpoint, since only 36 per cent of such pollen stored by the bees will provide a source of protein for the larvae.

On most mornings *Bombus* appeared between 5:20 and 5:30 a.m. and continued to collect pollen until the supply was exhausted or the flowers began to wilt at mid-morning. However, it took the first arrivals much longer to obtain a pollen load when the flowers were first opening than it did an hour later. No other bees worked *S. elaeagnifolium* at this site, but *Exomalopsis solani* Cockerell visits it and other purple-flowered species elsewhere. This is a small bee and its method of extracting pollen has not been reported. At Sonoita Creek near Patagonia, Arizona, P. H. Timberlake found the heavy bodied *Protoxaea gloriosa* (Fox), and the medium sized *Psaenythia mexicanorum* (Cockerell) and *Nomia tetrazonata* Cockerell taking pollen from *Solanum rostratum* (Buffalo-bur), an annual, yellow-flowered species.

In Paraguay, Schrottky (1907) reported that a male of *Ptiloglossa matutina* Schrottky (1904) entered his room at 4 a.m., "attracted doubtless by the shining lamp". He also stated that "*Ptiloglossa eximia* (Smith)"[2] had been observed on the wing after sunset and before sunrise, but never after seven o'clock in the morning. He concluded from the early flight of *Pt. matutina* that on warm nights the *Ptiloglossa* are flying all night long. He also referred to their rapid flight but indicated that they were not rare in nature, even though scarce in collecions. "If one knows their food-plants, they may at times be seen by thousands, as I found in Brazil in the case of *eximia* and in Paraguay with *matutina*". These food plants he had recorded earlier as *Solanum balbisi* and *S. juciri* (Solanaceae), *Tradescantia dimetica* (Commelinaceae) and *Eriobotrya japonica* (Rosaceae) (Schrottky, 1906). Matinal species of *Ptiloglossa* have also been observed in Mexico by Michener (Linsley, 1958).

That some *Ptiloglossa* do, indeed, fly all night is indicated by observations reported by Vesey-Fitzgerald (1939) for *Pt. fulvipilosa* Cameron of Trinidad. This species "may be heard buzzing 'round certain flowering trees during the night but directly the first light of dawn shows over the horizon they, with one accord, return to their burrows and are not seen again all day". Vesey-Fitzgerald also records matinal pollen collecting activity for *Epicharis* spp. (Anthophoridae: Centridini), some of which are visitors of *Solanum*. *E. lateralis* Smith visits *Byrosonima trinitatis* (a member of the Neotropical family Malpighiaceae) before dawn,

[2] Presumably referring to the species subsequently described as *Pt. dubia* Moure (1945).

and *E. rustica flava* not only takes pollen from *Byrosonima* and *Solanum,* but was also found nesting deep in a mine near the limit of penetration of daylight.

The first record of matinal activity of a colletid known to me is that of Cockerell and Porter (1899), who reported the capture of "an excellent series" of *Caupolicana yarrowi* (Cresson) at La Cueva, Organ Mountains, New Mexico, alt. 5300 ft., September 5, at flowers of *Datura meteloides* before sunrise (5:15-6:15 a.m.). Two additional specimens, also taken before sunrise, were at flowers of *Lippia wrightii,* but it is not recorded whether pollen was gathered in either case. Linsley and Hurd (1959) observed males of *C. yarrowi* taking nectar at dawn from *Larrea divaricata* at Granite Pass, Hidalgo Co., New Mexico, in August, and Linsley (1960) reported similar activity before sunrise at flowers of *Melilotus alba,* near Portal, Arizona. The same or a related species was collected repeatedly in Mexico by P. D. Hurd and H. E. Evans at flowers of *Eysenhardtia* in the late afternoon (before and after sunset) and early morning (before and after sunrise) (Hurd, *in litt*). Mitchell (1960) noted that both sexes of *Caupolicana electa* (Cresson) have been collected at *Trichostema dichotemum* around sunrise and males also in the late afternoon or at dusk visiting *Trichostema* and *Aureolaria. Trichostema* spp., known as blue-curls, are strong-scented Labiatae with long, exserted stamens and stigma.

Finally, it may be mentioned that *Colletes stepheni* Timberlake (1958), the largest known North American species of the genus, collects pollen before sunrise from *Larrea divaricata* and *Cercidium floridum.* At Hopkins Well, 18 miles west of Blythe, Riverside County, California, Hurd and Powell (1958) reported females gathering pollen, as early as 4:20 a.m., although the height of the provisioning period judged by observations at the nest site, was between 5:00 and 6:30 a.m.

From these fragmentary observations it may be concluded tentatively that (1) matinal pollen collecting activity is characteristic of species in several genera of colletids, (2) the species involved tend to be large, fast flying, wide ranging bees, in some cases with enlarged lateral ocelli, (3) at least a portion of them appear to be restricted to plants which present their pollen during the night or shortly after dawn, and (4) some species exhibit adaptations for collecting pollen from plants with particular floral and/or pollen characteristics.

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## ZOOLOGICAL NOMENCLATURE

### NOTICE OF PROPOSED USE OF PLENARY POWERS IN CERTAIN CASES (A. (N.S.) 53)

In accordance with a decision of the 13th International Congress of Zoology, 1948, public notice is hereby given of the possible use by the International Commission on Zoological Nomenclature of its plenary powers in connection with the following cases, full details of which will be found in Bulletin of Zoological Nomenclature, Vol. 19, Part 2, to be published on 23rd March, 1962.

(4) Designation of a type-species for *Cyrnus* Stephens, 1836 (Insecta, Trichoptera). Z.N. (S.) 1491.

Any zoologist who wishes to comment on any of the above cases should do so in writing, and in duplicate, as soon as possible, and in any case before 23rd September, 1962. Each comment should bear the reference number of the case in question. Comment received early enough will be published in the *Bulletin of Zoological Nomenclature*. Those received too late for publication will, if received before 23rd September, 1962, be brought to the attention of the Commission at the time of commencement of voting.

All communications on the above subject should be addressed as follows: The Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, LONDON, S.W. 7, England.—W. E. CHINA, *Assistant Secretary to the International Commission on Zoological Nomenclature.*